PRODUCT DATASHEET

Resource Arbitration Processor (RAP)-OC3/12

DESCRIPTION

The Calix C7 RAP-OC3/12 is a common control plug-in card that contains the switch matrix, real-time processor and memory, and timing source for the Calix C7 system. The RAP-OC3/12 maintains the database of the Calix C7 system in nonvolatile memory for storage of cross-connect information and system software. In addition to its common control function, the card contains one optical interface to be used as a protocol-flexible network interface, subscriber interface, or inter-terminal transport. The combination of functionality on a single card radically lowers start-up costs and frees more slots for revenue-generating services. The RAP-OC3/12 supports STS-1-mapped traffic in STS-1, STS-3c, or STS-12c increments. Each STS-n can carry any payload type (TDM, ATM, Ethernet, IP/MPLS).

The optical interface included in this common control card yields a drastically low start up cost for hi-speed optical transport and is software-selectable to OC-3 or OC-12. Rate flexibility yields benefits in lower inventory requirements as well as ease of upgrade. The rate of the RAP-OC3/12 can be upgraded from a remote location at any time–no truck rolls required. Additionally, the RAP-OC3/12 is equipped with network processors that deliver traffic management and wire speed forwarding capability for its optical interface and for other low-speed interface plug-in cards located in universal slots of the system (i.e., POTS and ADSL). When used as inter-terminal transport between Calix C7 nodes, the RAP-OC3/12 provides packet concentration functionality - packet traffic from multiple nodes is statistically multiplexed into a single pool of bandwidth shared across the transport network. This results in significant bandwidth savings when compared to multiple point-to-point connections required with SONET multiplexors.

The RAP-OC3/12 card plugs into either of the two common control slots of the Calix C7 shelf (CS-A and CS-B). Physical access to the OC-3/12 interface on the RAP-OC3/12 card is through standard LC connectors mounted on the faceplate of the card.

KEY ATTRIBUTES

SWITCHING CAPACITY: The RAP-OC3/12 manages up to 50 Gbps of user traffic in the Calix C7 shelf, and supports the following switching and cross-connect capabilities:

- Packet switch: Asymmetric fabric (optimized for access and transport applications)
  - 2.4 Gbps ingress (actual packet traffic)
  - 50 Gbps egress (multicast)
- STS cross connect: 1,056 STS-1 cross-connects for STS-based signals. The switch matrix on the RAP-OC3/12 cross-connects TDM traffic in a byte-interleaved manner identical to a traditional SONET ADM.
- DS0 cross connect: 11,700 DS0 cross-connects for POTS and other DS0-based services

Calix

PRODUCT DATASHEET

RAP-OC3/12

This versatile bandwidth and switching capacity enables service providers to support their needs today while building capacity and packet processing capability for their subscribers' service needs of the future.

PACKET-BASED PATH PROTECTION: In addition to traditional SONET protection schemes (UPSR, LAPS), the Calix C7 implements a packet-based path protection scheme that provides a shared pool of bandwidth (STS-1, STS-3c, STS-12c) across multiple nodes for statistical multiplexing of packet traffic (ATM, IP, etc). For example, one STS-3c can be provisioned in a ring to add and drop ATM traffic at multiple nodes. This protection scheme provides the benefits of SONET survivability with the bandwidth efficiency gained from traffic shaping and aggregation. This capability is in addition to the traditional path and line SONET protection capabilities.

FLEXIBLE PROTOCOL SUPPORT: The RAP-OC3/12 is equipped with network processors that deliver traffic management and wire speed packet forwarding capability on each payload up to STS-12c. This allows the user to configure the card to support multiple protocols simultaneously over the same fiber link. In particular, the optical interface on the RAP-OC3/12 supports the following configurations:

- Channelized: Supports STS- mapped traffic in STS-1, STS-3c, or STS-12c increments. Each STS-1 or STS-(N)c can contain different payload types (TDM, ATM, Ethernet, IP/MPLS). The RAP-OC3/12 can terminate and process each payload up to STS-12c.
- ATM UNI/NNI: Supports CBR, UBR, rt-VBR, nrt-VBR and GFR service categories with up to 12,500 user PVCs.

DISTRIBUTED PACKET SWITCH FABRIC: The centralized packet switching fabric on the RAP-OC3/12 combines with the packet-based optical and DS3 plug-in cards to form a distributed switch fabric. The individual plug-in cards perform packet concentration and traffic shaping. This function separates actual packet traffic from the physical interface and aggregates it across all ports on the card before forwarding the payload to the centralized switch fabric on the RAP-OC3/12. This combination results in very efficient use of centralized switching resources, and in tremendous scalability potential via distributed packet processing.

GR-253-CORE COMPLIANT: Standard SONET compliance enables a network of Calix C7 systems to seamlessly and transparently co-exist with currently deployed SONET networks from other vendors. It also enables service providers to continue utilizing their existing SONET test equipment and procedures.

Calix

S P E C I F I C A T I O N S

RAP-OC3/12

ORDERING INFORMATION

Calix Part No. 100-00330

COMMON CONTROL FUNCTIONS

SWITCHING CAPACITY

STS—1,056 x 1,056 STS-1 cross-connections

ATM traffic—32K PVCs, Asymmetric 2.4 Gbps ingress, 50 Gbps egress (multicast)

TDM traffic—11,700 DS0 cross-connections

CLOCKS AND SYNCHRONIZATION

Stratum 3, holdover

Clock inputs: Composite Clock (CC), external

EQUIPMENT PROTECTION

(Optional) 1:1

Common control protection switching is handled independently from optical protection switching.

TRANSPORT INTERFACE

DATA RATE

Software selectable 155 Mbps or 622 Mbps

TRANSMITTER WAVELENGTH

1260–1360nm, nominal 1310 nm

RECEIVER INPUT WAVELENGTH

1310 nm

TRANSMIT POWER (ALL RATES)

Maximum –3 dBm

Minimum –7 dBm

RECEIVER INPUT

OC-3—Maximum –3 dBm, Minimum –28 dBm

OC-12—Maximum –3 dBm, Minimum –28 dBm

FIBER TYPE

Single mode (SMF-28)

LINK LOSS BUDGET

OC3—20 dB

OC12—20 dB

CONNECTOR TYPE

LC mounted on card faceplate

PROTECTION

PATH:

Unidirectional path switched ring (UPSR, STS traffic)

UPSR with packet aggregation (STS and/or packet traffic)

Linear path protection switching (STS and/or packet traffic)

LINE:

1+1 automatic protection switching (1+1 APS), uni- or bidirectional

1:1 automatic protection switching (1:1 APS), uni- or bidirectional

ATM

UNI 3.0/3.1 PVC support

CBR, UBR, rtVBR, nrtVBR, and GFR

Full VPI/VCI address field

12.5K PVCs for optical interface

Per-VC dual leaky bucket policing supported on all PVCs

Per-VC traffic shaping supported on all PVCs

F4/F5 OAM cells for management

STATUS INDICATORS

FAIL: Red – Card has failed

ACTIVE: Green – One or more of the optical ports are provisioned

STBY: Yellow – Card is in standby mode for protection

NE: Red – Near-end failure on at least one interface

FE: Yellow – Far-end failure on at least one interface

FAC: Green – Indicates the optical facility is active

POWER DISSIPATION

65 Watts per card

PHYSICAL DIMENSIONS

Size: 9.3 inches (height) x 0.7 inches (width) x 9.0 inches (depth)

OPERATING ENVIRONMENT

Temperature: –40° C to +65° C (–40° F to +149° F)

Humidity: 5 to 90% non-condensing

Altitude: to 13,125 feet

STORAGE TEMPERATURE

–40° C to +70° C (–40° F to +158° F)

Calix

SPECIFICATIONS

RAP-OC3/12

NEBS LEVEL 3 COMPLIANCE

Telcordia GR-63-CORE, "Network Equipment-Building System (NEBS) Requirements," Issue 1, October 1995.

Telcordia GR-1089-CORE, "Electromagnetic Compatibility and Electrical Safety," Telcordia, Issue 2, December 1997 with revision 1, February 1999.

Telcordia GR-3028-CORE, "Thermal Management in Telecommunications Central Offices", 2001

EMI/RFI

FCC Part 15 Class A

SAFETY

NTRL-UL 1950

STANDARDS SUPPORT

Telcordia, GR-253-CORE, Synchronous Optical Network (SONET) Transport Systems: Common Generic Criteria, Issue 3, September 2000.

Telcordia, GR-499-CORE, Transport Systems Generic Requirements (TSGR): Common Requirements, Issue 2, December 1998.

Telcordia, GR-496, SONET Add-Drop Multiplex Equipment (SONET ADM) Generic Criteria, Issue 1, December 1998.

Telcordia, GR-1244-CORE, Clocks for the Synchronized Network: Common Generic Criteria, Issue 2, December 2000.

Telcordia, GR-1400-CORE, SONET Dual-Fed Unidirectional Path Switched Ring (UPSR) Equipment Generic Criteria, Issue 2, January 1999.

ANSI T1.405-1995, SONET-Payload Mappings.

ANSI T1.105, Synchronous Optical Network (SONET) - Automatic Protection.

ITU-T, I.610, B-ISDN Operation and Maintenance Principles and Functions, 1999.

ATM Forum UNI 3.0/3.1.

ATM Forum Traffic Management 4.0/4.1

Calix

1035 N. McDowell Blvd., Petaluma, CA 94954
tel: 877.766.3500 www.calix.com

250-00088, Rev. 12